ENCLOSURE: TECHNICAL SUPPORT DOCUMENT FOR EPA CONCURRENCE ON PM_{10} EXCEEDANCES MEASURED IN THE SACRAMENTO COUNTY MAINTENANCE AREA ON NOVEMBER 10-12 AND NOVEMBER 14-16, 2018 AS EXCEPTIONAL EVENTS

On April 26, 2021, the California Air Resources Board (CARB) submitted an exceptional event demonstration prepared by the Sacramento Metropolitan Air Quality Management District (SMAQMD or "District") for exceedances of the 1987 24-hour particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM_{10}) National Ambient Air Quality Standards (NAAQS) of 150 micrograms per cubic meter ($\mu g/m^3$) that occurred at the Sacramento T Street, North Highlands, Del Paso Manor, and Sacramento Branch Center monitoring sites on November 10-12, 2018 and November 14-16, 2018.[1] The demonstration submitted by CARB and SMAQMD stated that the exceedances measured on November 10-12 and November 14-16, 2018 were caused by the Camp Fire wildfire originating in Butte County, California.[2] Under the Exceptional Events Rule, air agencies can request the exclusion of event-influenced data, and the EPA can agree to exclude these data, from the data set used for certain regulatory decisions. The remainder of this document summarizes the Exceptional Events Rule requirements, the event and the EPA's review process.

EXCEPTIONAL EVENTS RULE REQUIREMENTS

The EPA promulgated the Exceptional Events Rule in 2007, pursuant to the 2005 amendment of Clean Air Act (CAA) Section 319. In 2016, the EPA finalized revisions to the Exceptional Events Rule. The 2007 Exceptional Events Rule and 2016 Exceptional Events Rule revisions added sections 40 CFR §50.1(j)-(r); §50.14; and §51.930 to title 40 of the Code of Federal Regulations (CFR). These sections contain definitions, criteria for EPA approval, procedural requirements, and requirements for air agency demonstrations. The EPA reviews the information and analyses in the air agency's demonstration package using a weight of evidence approach and decides to concur or not concur. The demonstration must satisfy all of the Exceptional Events Rule criteria for the EPA to concur with excluding the air quality data from regulatory decisions.

Under 40 CFR §50.14(c)(3)(iv), the air agency demonstration to justify exclusion of data must include:

A. "A narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s);"

B. "A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation;"

[1] SMAQMD, "Exceptional Event Documentation for November 2018 PM_{10} Exceedances in Sacramento County Due to Wildfires," March 2021 ("demonstration").
[2] See demonstration, p. ES-1.

C. "Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times" to support requirement (B) above;

D. "A demonstration that the event was both not reasonably controllable and not reasonably preventable;" and

E. "A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event."[3]

In addition, the air agency must meet several procedural requirements, including:

1. submission of an Initial Notification of Potential Exceptional Event and flagging of the affected data in the EPA's Air Quality System (AQS) as described in 40 CFR §50.14(c)(2)(i),

2. completion and documentation of the public comment process described in 40 CFR §50.14(c)(3)(v), and

3. implementation of any relevant mitigation requirements as described in 40 CFR §51.930.

For data influenced by exceptional events to be used in initial area designations, air agencies must also meet the initial notification and demonstration submission deadlines specified in Table 2 to 40 CFR §50.14. We include below a summary of the Exceptional Events Rule criteria, including those identified in 40 CFR §50.14(c)(3)(iv).

Regulatory Significance

The 2016 Exceptional Events Rule includes regulatory language that applies the provisions of CAA section 319 to a specific set of regulatory actions. As identified in 40 CFR §50.14(a)(1)(i), these regulatory actions include initial area designations and redesignations; area classifications; attainment determinations (including clean data determinations); attainment date extensions; findings of State Implementation Plan (SIP) inadequacy leading to a SIP call; and other actions on a case-by-case basis as determined by the Administrator. Air agencies and the EPA should discuss the regulatory significance of an exceptional events demonstration during the Initial Notification of Potential Exceptional Event prior to the air agency submitting a demonstration for the EPA's review.

Narrative Conceptual Model

The 2016 Exceptional Events Rule directs air agencies to submit, as part of the demonstration, a narrative conceptual model of the event that describes and summarizes the event in question and provides context for analyzing the required statutory and regulatory technical criteria. Air

[3] A natural event is further described in 40 CFR 50.1(k) as "an event and its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role. For purposes of the definition of a natural event, anthropogenic sources that are reasonably controlled shall be considered to not play a direct role in causing emissions."

agencies may support the narrative conceptual model with summary tables or maps. For wildfire PM_{10} events, the narrative conceptual model should also discuss the interaction of emissions, meteorology, and PM_{10} concentrations in the area during the event, and, under 40 CFR §50.14(a)(1)(i), must describe the regulatory significance of the proposed data exclusion.

Clear Causal Relationship and Supporting Analyses

The EPA considers a variety of evidence when evaluating whether there is a clear causal relationship between a specific event and the monitored exceedance or violation. For wildfire PM_{10} events, air agencies should compare the PM_{10} data requested for exclusion with seasonal and annual historical concentrations at the air quality monitor to establish a clear causal relationship between the event and monitored data. In addition to providing this information on the historical context for the event-influenced data, air agencies should further support the clear causal relationship criterion by demonstrating that the wildfire's emissions were transported to the monitor, that the emissions from the wildfire influenced the monitored concentrations, and, in some cases, air agencies may need to provide evidence of the contribution of the wildfire's emissions to the monitored PM_{10} exceedance or violation.

Not Reasonably Controllable or Preventable

The Exceptional Events Rule requires that air agencies establish that the event be both not reasonably controllable and not reasonably preventable at the time the event occurred. This requirement applies to both natural events and events caused by human activities; however, it is presumed that wildfires on wildland will satisfy both factors of the "not reasonably controllable or preventable" element unless evidence in the record clearly demonstrates otherwise.[4]

Natural Event

According to the CAA and the Exceptional Events Rule, an exceptional event must be "an event caused by human activity that is unlikely to recur at a particular location *or* a natural event" (emphasis added). The 2016 Exceptional Events Rule includes in the definition of wildfire that "[a] wildfire that predominantly occurs on wildland is a natural event." Once an agency provides evidence that a wildfire on wildland occurred and demonstrates that there is a clear causal relationship between the measurement under consideration and the event, the EPA expects minimal documentation to satisfy the "human activity that is unlikely to recur at a particular location or a natural event" element. The EPA will address wildfires on other lands on a case-by-case basis.

EPA REVIEW OF EXCEPTIONAL EVENTS DEMONSTRATION

On August 21, 2019, CARB submitted an Initial Notification of a potential Exceptional Event prepared by SMAQMD for numerous exceedances of the 1987 24-hour PM_{10} NAAQS that

[4] A wildfire is defined in 40 CFR 50.1(n) as "any fire started by an unplanned ignition caused by lightning; volcanoes; other acts of nature; unauthorized activity; or accidental, human-caused actions, or a prescribed fire that has developed into a wildfire. A wildfire that predominantly occurs on wildland is a natural event." Wildland is defined in 40 CFR 50.1(o) as "an area in which human activity and development are essentially non-existent, except for roads, railroads, power lines, and similar transportation facilities. Structures, if any, are widely scattered."

occurred at the Sacramento T Street, North Highlands, Del Paso Manor, and Sacramento Branch Center PM_{10} monitoring sites within the Sacramento County, California PM_{10} Maintenance Area on November 10-12 and November 14-16, 2018.[5] On April 26, 2021, CARB submitted an exceptional event demonstration prepared by SMAQMD for 13 exceedances of the 1987 24-hour PM_{10} NAAQS that occurred at the Sacramento T Street, North Highlands, Del Paso Manor, and Sacramento Branch Center PM_{10} monitoring sites within Sacramento County on November 10-12 and November 14-16, 2018.[6]

Regulatory Significance

The EPA determined that data exclusion of certain exceedances referenced in the Initial Notification may have a regulatory significance for demonstrating attaining design values for approval of the second 10-year maintenance plan for the Sacramento maintenance area for the 1987 24-hour PM_{10} NAAQS and worked with CARB and SMAQMD to identify the relevant exceedances and monitoring sites affected.[7] Table 1 summarizes the exceedances that SMAQMD included in the demonstration.

Table 1: 1987 24-hour PM_{10} NAAQS Exceedance Summary

Exceedance Date	Monitoring Site Name	AQS ID[a]	1987 24-hour Avg. (µg/m^3)
November 10, 2018	Sacramento T Street	06-067-0010-4	189
November 10, 2018	North Highlands	06-067-0002-1	222
November 10, 2018	Del Paso Manor	06-067-0006-1	212
November 10, 2018	Del Paso Manor	06-067-0006-2 [b]	202
November 10, 2018	Sacramento – Branch Center	06-067-0284-1	200
November 11, 2018	Sacramento T Street	06-067-0010-4	176
November 12, 2018	Sacramento T Street	06-067-0010-4	183
November 14, 2018	Sacramento T Street	06-067-0010-4	181
November 15, 2018	Sacramento T Street	06-067-0010-4	292
November 16, 2018	Sacramento T Street	06-067-0010-4	252
November 16, 2018	North Highlands	06-067-0002-1	163
November 16, 2018	Del Paso Manor	06-067-0006-1	166
November 16, 2018	Del Paso Manor	06-067-0006-2 [b]	163

[a] The last number in the AQS ID is the Parameter Occurrence Code (POC) and distinguishes between different monitors at the same site.
[b] The Del Paso Manor (POC 2) monitor is a collocated monitor for quality assurance purposes, and the data from this monitor is not used for comparison to the NAAQS. However, for completeness, CARB, SMAQMD, and the EPA included this monitor in the demonstration and concurrence process.

Narrative Conceptual Model

The demonstration submitted by CARB and SMAQMD provided a narrative conceptual model in Sections 1, 2, and 3 to describe how emissions from the Camp Fire caused the PM_{10}

[5] See email from Sylvia Vanderspek, CARB, to Gwen Yoshimura, EPA Region 9, dated August 21, 2019.
[6] See letter from Michael Benjamin, CARB, to Elizabeth Adams, EPA Region 9, dated April 26, 2021.
[7] See letter from Elizabeth Adams, EPA Region 9, to Michael Benjamin, CARB, dated October 9, 2019.

exceedances at the Sacramento T Street, North Highlands, Del Paso Manor, and Sacramento Branch Center monitoring sites. The narrative conceptual model included a description of the Camp Fire and its progression, the general meteorological conditions in the affected area, and information regarding how PM_{10} concentrations measured during this period compared to normal conditions across the Sacramento Valley.[8] The demonstration also included a description of the ambient PM_{10} monitoring network in Sacramento County.[9] The demonstration addressed the regulatory significance of the exceedances, stating that these exceptional event days are significant for the approval of the second 10-year maintenance plan for the Sacramento maintenance area for the 1987 24-hour PM_{10} NAAQS.[10]

The demonstration included a summary of the event, stating that the Camp Fire began in Butte County on November 8, 2018, due to electrical powerline failure and was not contained until November 25, 2018. The California Department of Forestry and Fire Protection (CalFire) determined that the Camp Fire was one of the deadliest and most destructive wildfires recorded in California history, and burned a total of 153,336 acres.[11] Fire boundary maps and a table summarizing the fire's progression from November 8-16, 2018, contain information such as the date, total acres burned, percent containment, and excerpts from the National Weather Service (NWS) Area Forecast Discussions.[12] The NWS area forecast discussions describe meteorological conditions favorable to the ignition and rapid spread of the Camp Fire throughout Northern California, such as strong winds, dry vegetation, and low humidity.[13]

The demonstration also included a description of the general meteorological conditions that led to the ignition of the Camp Fire and transport of the resultant wildfire emissions to the maintenance area, National Oceanic and Atmospheric Administration (NOAA) national temperature and precipitation maps, daily surface weather maps, NWS Sacramento and San Francisco Bay Area Red Flag Warnings for November 8, 2018, and news and social media reports detailing the wildfire activity and smoke impacts in Sacramento.[14] The NOAA maps of average temperature rank for June-August 2018 and percent of normal monthly precipitation for October 2018 support that California experienced above average temperatures and below average precipitation rates prior to and during the Camp Fire. The demonstration stated that heavy gusts transported the smoke generated by the Camp Fire into downwind communities, and that northeasterly winds pushed the smoke from the fire into Sacramento County and beyond, into the San Francisco Bay Area.[15] The demonstration also referenced use of the National Aeronautics and Space Administration's (NASA) Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation (CALIPSO) satellite, which observed smoke layers at the ground between 0-2 kilometers (km) near the San Francisco Bay Area on November 10, 2018. Though the demonstration references the results of the satellite imagery, it does not include the imagery.[16] The demonstration also stated that "light winds and strong temperature inversions in Sacramento

[8] See demonstration, pp. 3-1 to 3-13.
[9] See demonstration, pp. 2-1 to 2-2.
[10] See demonstration, pp. 1-2.
[11] See demonstration, pp. 3-1.
[12] See demonstration, pp. 3-2 to 3-7.
[13] See demonstration, pp. 3-5 to 3-6.
[14] See demonstration, pp. 3-3 to 3-11, Appendix A.
[15] See demonstration, p. 3-5.
[16] See demonstration, p. 3-5.

County forced the dense smoke plume to settle at ground level, causing poor visibility and hazardous particulate matter concentrations."[17] The surface weather maps indicate a weak pressure gradient across California which can be associated with stagnant conditions that could trap smoke at the surface level. Appendix A of the demonstration included additional media, newspaper articles, and social media posts for November 10-16, 2018, all of which discussed smoke impacts from the Camp Fire consistent with the information presented in the conceptual model.[18]

The demonstration presented a table ranking the exceedances that occurred at the Sacramento T Street, North Highlands, Del Paso Manor, and Sacramento Branch Center monitoring sites on November 10-16, 2018, as compared to all PM_{10} averages in Sacramento County and all other PM_{10} averages at the respective sites for 2015-2019.[19] These monitors measured concentrations exceeding the PM_{10} NAAQS during the event, and the 13 exceedances requested for exclusion in the demonstration fell within the 14 highest concentrations that were recorded over the five-year period.[20]

The demonstration also described SMAQMD's public notification process for alerting the public of wildfire smoke impacts to Sacramento County, including various press releases and public advisories such as Air Quality Alerts.[21]

Based on the information described above, the demonstration submitted by CARB prepared by SMAQMD meets the narrative conceptual model criterion of the Exceptional Events Rule.

Table 2: Documentation of the Narrative Conceptual Model

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
November 10-12, 2018 November 14-16, 2018	Section 3: pp. 3-1 to 3-13 Appendix A: pp. A-1 to A-15 Appendix D: pp. D-1 to D-3	Sufficient	Yes

Clear Causal Relationship

The demonstration included several analyses to support a clear causal relationship between the wildfire event and the monitored exceedances. These analyses are presented in Section 4.

Comparison with historical concentrations

The demonstration included a comparison with historical concentrations, as required by 40 CFR §50.14(c)(3)(iv)(C). The demonstration compared 24-hour PM_{10} concentrations measured at the Sacramento T Street, North Highlands, Del Paso Manor, and Sacramento Branch Center monitoring sites during the Camp Fire event to historical data by plotting all concentrations measured from 2015-2019 and by comparing average PM_{10} concentrations during the month of

[17] See demonstration, p. 3-5.
[18] See demonstration, Appendix A, pp. A-1 to A-15.
[19] See demonstration, pp. 3-12 to 3-13.
[20] See demonstration, p. 3-2, 4-10, 7-1.
[21] See demonstration, Appendix D, pp. D-1 to D-3.

November from years 2015-2019.[22] The analysis showed that during November 2018, the average PM_{10} concentration at each monitoring site was five times higher than the average concentration for the month of November in 2015, 2016, and 2017, and two times higher than the average concentration in November 2019. The plots of 2015-2019 concentrations also show that 24-hour average concentrations typically remain below 50 $\mu g/m^3$ throughout the year, and only twice exceeded 100 $\mu g/m^3$ on dates outside of the November 2018 time period associated with this demonstration. As described in the conceptual model, the 13 exceedances measured between November 10-18, 2018, were among the 14 highest concentrations measured at each site during the period for 2015-2019.[23] The other exceedance within the top 14 concentrations, which was measured on October 27, 2019, was determined to not have regulatory significance and was not addressed in this demonstration.[24]

Evidence of transport of wildfire emissions from the wildfire to the monitor

The demonstration presented Moderate Resolution Imaging Spectroradiometer (MODIS) satellite imagery with wind data, Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) analysis, ceilometer data, and regional PM_{10} concentrations and Air Quality Index (AQI) information to show how transport of smoke from wildfires into Sacramento County caused the exceedances on November 10-12 and November 14-16, 2018.

Figures 4-4a through 4-4g of the demonstration provide MODIS satellite imagery showing smoke over Sacramento County on November 10-16, 2018, overlaid with active fire detections and wind barbs..[25] As shown in Figure 4-4a, on November 10, 2018, a thick gray smoke plume was concentrated around the Camp Fire and much of Northern California, including the four PM_{10} monitors that measured exceedances in Sacramento County. The smoke remained present at and around the Camp Fire throughout the November 10-16, 2018 event period. The satellite imagery and wind barbs support that smoke generally moved south and southeast towards the monitors during the event period.[26] The satellite imagery also shows that smoke was present over the Sacramento area and the affected monitors on the exceedance days.

Figures 4-4a through 4-4g in the demonstration also presented backward trajectories from the HYSPLIT model to more clearly show transport of smoke from the Camp Fire to the exceeding monitoring sites. The figures included a 24-hour backward trajectory for each day between November 10 and November 16, 2018, starting from the Sacramento T Street monitoring station and overlaid onto the MODIS satellite imagery, and an altitude profile for each exceedance date for trajectories initiated at 50-, 500-, and 1000-meter elevations. Overall, while there is some variability with individual trajectories and dates, the backward trajectories for the exceedance days generally pass through areas of heavy smoke and near the fire location. The District used ceilometer data measured approximately 30 km away from the monitoring site to estimate the boundary layer height and estimated it to reach 500 meters throughout the event period, noting that the ceilometer data also provided evidence that smoke was present in several layers at

[22] See demonstration, pp. 4-1 to 4-7.
[23] See demonstration, p. 3-12.
[24] See demonstration., pp. 3-12, 4-2.
[25] See demonstration, pp. 4-11 to 4-16.
[26] See demonstration, pp. 3-11 to 3-16.

multiple heights.[27] The demonstration emphasizes that although the 500- and 1000-meter trajectories are not always below the boundary layer, the 50-meter trajectories indicated that the smoke trapped within the lowest portion of the atmosphere was consistently being transported to the monitors from the northeast where the fire was located.[28] The demonstration only included trajectories from the Sacramento T Street monitoring site and not the other exceeding monitors; however, the trajectories are likely also reflective of transport patterns for the other monitors, which are all located within approximately 12 miles of the Sacramento T Street monitoring site.[29]

Appendix B included maps of Sacramento and the surrounding area, overlaid with the boundary of the Camp Fire and daily PM_{10} 24-hour concentrations at various monitors, to show the daily geographic extent of PM_{10} concentrations from November 7-25, 2018.[30] Concentrations of PM_{10} at all sites shown were below 50 $\mu g/m^3$ on November 7, 2018, prior to the start of the Camp Fire. PM_{10} concentrations began increasing starting on November 8, 2018, coincident with the start of the Camp Fire; the highest concentrations initially were measured north of Sacramento, closer to the Camp Fire, supporting that the elevated PM_{10} monitoring concentrations reflect smoke transport from the fire. In particular, the Chico monitoring site, which is the site located closest to the fire, began exceeding the PM_{10} NAAQS on November 9, 2018, and continued to exceed the NAAQS until November 18, 2018.[31] Concentrations in the Sacramento area and other nearby sites began exceeding the PM_{10} NAAQS of 150 $\mu g/m^3$ on November 10, 2018. Concentrations south of the fire near the exceeding monitors increased and remained high through November 16, 2018, before tapering off. The PM_{10} concentrations measured north, east, south, and west of the Sacramento monitors are consistent with the smoke being transported from the Camp Fire to the exceeding monitors in the Sacramento area.

Appendix C included maps of the particulate matter (PM) AQI (includes $PM_{2.5}$ and PM_{10}) on November 7-25, 2018, which showed air quality throughout the Sacramento Valley degrading after the start of the fire on November 8, 2018. The maps show that concentrations reached Unhealthy, Very Unhealthy, or Hazardous AQI levels between November 10 and November 19, 2018, across much of Sacramento and the surrounding areas. The poor AQI from PM observed during this period is consistent with the discussion and analyses in Section 4 and Appendix B of the demonstration, presented to support that smoke from the Camp Fire was transported to the monitors and reached ground level.[32]

Overall, the trajectory analysis and satellite imagery coupled with evidence of smoke reaching the ground shows that emissions from the Camp Fire were transported to the maintenance area and monitoring sites on November 10-16, 2018.

<u>Evidence that the wildfire emissions affected the monitor</u>

[27] See demonstration, p. 4-13, 4-17.
[28] See demonstration, p. 4-13.
[29] Monitoring site locations and distances can be found and evaluated using the EPA's Interactive Map of Air Quality Monitors, located at *https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors.*
[30] See demonstration, Appendix B, pp. B-1 to B-11.
[31] See demonstration, p. 4-8.
[32] See demonstration, Appendix C, pp. C-1 to C-6.

The demonstration provided several forms of evidence that the wildfire emissions reached the ground and affected the exceeding monitors, including 24-hour average concentrations of particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers ($PM_{2.5}$), carbon monoxide (CO), black carbon (BC), and organic carbon (OC); observations of regional increases in PM_{10} and PM AQI; and air quality advisories and news reports of the ground level smoke impacts near the affected sites.

The demonstration provided an analysis of regulatory and non-regulatory 24-hour average $PM_{2.5}$ concentrations during the month of November between 2015-2019 at the Del Paso Manor and Sacramento T Street monitoring sites in Figures 4-6a through 4-6c.[33] The demonstration noted that during wildfire events, smoke increases $PM_{2.5}$ concentrations along with PM_{10} concentrations.[34] $PM_{2.5}$ concentrations at both monitoring sites show a small increase on November 9 and a dramatic one on November 10, 2018, with concentrations much higher than in other years. $PM_{2.5}$ concentrations at Del Paso Manor were high through November 15, 2018, and were slightly elevated again on November 20, 2018; data for this site was not available in AQS for November 16-19, 2018. Concentrations at the Sacramento T Street non-regulatory $PM_{2.5}$ monitor remained high through November 20, 2018. These data were consistent with the regulatory $PM_{2.5}$ monitoring data collected at Sacramento T Street, which was only available for November 10 and 13, 2018. The increases in $PM_{2.5}$ at both sites were consistent with the start date of the Camp Fire and smoke transport to monitoring sites across Sacramento described previously. All sites show much lower $PM_{2.5}$ concentrations after November 20, consistent with the timing of smoke dispersion conditions for the remainder of the month of November 2018 at all affected monitoring sites. The demonstration also discussed the potential influence on $PM_{2.5}$ from residential wood combustion, a common source of $PM_{2.5}$ in the Sacramento area, and noted that all residential wood burning activities were not allowed as specified by District rules due to the Camp Fire and predicted smoke impacts, precluding residential wood burning as a significant source of the observed $PM_{2.5}$ during this period and implemented by the District's Check Before you Burn program.[35]

The demonstration also evaluated 24-hour average CO, BC, and OC concentrations during November 2015-2019 at the Del Paso Manor and North Highlands monitoring stations.[36] The plots in Figure 4-8a through 4-8d show that CO, BC, and OC concentrations recorded during the Camp Fire event between November 10 and 20, 2018 were clearly higher than other 24-hour concentrations measured in November over the other years. The three pollutant concentrations were generally elevated throughout the period of the event and tapered off as the smoke dissipated from the region between November 17-20, 2018. This pattern is consistent with the evidence presented in Section 4 of the demonstration.

As previously described in the Conceptual Model section of this document, Appendix A of the demonstration included additional media, newspaper articles, and SMAQMD air quality tools and social media posts for November 8-25, 2018.[37] These documents provide supporting information on the extent of the fire impact and surface observations showing smoke impacts and

[33] See demonstration, pp. 4-17 to 4-19.
[34] See demonstration, p. 4-17.
[35] See demonstration, p. 4-19.
[36] See demonstration, pp. 4-21 to 4-23.
[37] See demonstration, Appendix A, pp. A-1 to A-15.

reduced visibility, consistent with the discussion in Section 4 of the demonstration. These documents also support that the wildfire emissions affected the PM_{10} monitoring sites. Additionally, as discussed above, appendices B and C of the demonstration included maps of regional PM_{10} concentrations and PM AQI throughout the period of November 7-25, 2018, showing the regional scale of impacts from the wildfire on PM_{10} and PM AQI at monitors in and around the Sacramento area. In addition to providing evidence of transport, the maps also support that the wildfire emissions affected monitors regionally and throughout the Sacramento area.[38] Appendix D of the demonstration included Air Quality Advisories Wildfire Smoke Statements issued by SMAQMD for November 9, 14, and 16 of 2018, which further support that the air quality was at unhealthy levels during the time of the exceptional event due to ground level smoke.[39] Overall, the analysis of pollutant concentrations including PM_{10}, $PM_{2.5}$, CO, BC, and OC, along with news reports, AQI, regional PM_{10} concentrations, and air quality advisories issued by SMAQMD support that smoke from the Camp Fire reached the ground and affected the exceeding PM_{10} monitors in the Sacramento area during November 10-16, 2018.

Conclusion

The analyses included in the demonstration, specifically, the comparison with historical PM_{10} concentrations, HYSPLIT backward trajectory analyses, satellite imagery of smoke, ceilometer data, regional patterns of PM_{10} concentrations and PM AQI, $PM_{2.5}$ concentrations and comparison with historical data, increases in CO, OC, and BC concentrations, media NWS reports of wildfire smoke affecting the area, and District-issued air quality advisories, sufficiently demonstrate a clear causal relationship between the emissions generated by the Camp Fire and the exceedances measured at the Sacramento T Street, North Highlands, Del Paso Manor, and Sacramento Branch Center monitoring sites on November 10-12 and November 14-16, 2018.

Table 3: Documentation of the Clear Causal Relationship criterion

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
November 10-12, 2018 November 14-16, 2018	Section 3: pp. 3-11 to 3-16 Section 4: pp. 4-1 to 4-23 Appendix A: pp. A-1 to A-15 Appendix B: pp. B-1 to B-11 Appendix C: pp. C-1 to C-6 Appendix D: pp. D-1 to D-3	Sufficient	Yes

Not Reasonably Controllable or Preventable

The Exceptional Events Rule presumes that wildfire events on wildland are not reasonably controllable or preventable [40 CFR §50.14(b)(4)]. The demonstration provided evidence that the wildfire event meets definition of wildfire. Specifically, the demonstration included maps of the Camp Fire showing wildfire boundaries overlaid on topographic background maps, which demonstrate that the fires occurred on wildland and in the wildland-urban interface.[40] Additionally, the demonstration stated that the area where the Camp Fire started, on land near a national forest, meets the definition of a wildland area, that the city of Paradise and many of the

[38] See demonstration, Appendix B, pp. B-1 to B-11, Appendix C, pp. C-1 to C-6.
[39] See demonstration, Appendix D, pp. D-1 to D-3.
[40] See demonstration, pp. 3-2 to 3-3.

other communities where the wildfire burned are in the foothills of the Sierra Nevada mountain range within the wildland-urban interface, and that the fire burned predominantly on wildland.[41] The demonstration also noted that CalFire reported the Camp Fire as a wildland fire on November 8, 2018, and that the fire was caused by electrical transmission line failure.[42] Therefore, the documentation provided sufficiently demonstrates that the event was not reasonably controllable and not reasonably preventable.

Table 4: Documentation of the Not Reasonably Controllable or Preventable criterion

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
November 10-12, 2018 November 14-16, 2018	Section 3: pp. 3-1 to 3-3 Section 5: p. 5-1	Sufficient	Yes

Natural Event

The definition of "wildfire" at 40 CFR §50.1(n) states, "A wildfire that predominantly occurs on wildland is a natural event." As previously described, the demonstration included documentation that the event meets the definition of a wildfire and occurred predominantly on wildland and has therefore shown that the event was a natural event.

Table 5: Documentation of the Natural Event criterion

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
November 10-12, 2018 November 14-16, 2018	Section 6: p. 6-1	Sufficient	Yes

Schedule and Procedural Requirements

In addition to technical demonstration requirements, 40 CFR §50.14(c) and 40 CFR §51.930 specify schedule and procedural requirements an air agency must follow to request data exclusion. Table 6 outlines the EPA's evaluation of these requirements.

Table 6: Schedules and Procedural Criteria

	Reference	Demonstration Citation	Criterion Met?
Did the agency provide prompt public notification of the event?	40 CFR §50.14 (c)(1)(i)	Section 4: pp. 4-10 to 4-11 Appendix C: pp. C-1 to C-6 Appendix D: pp. D-1 to D-3	Yes

[41] See demonstration, p. 5-1.
[42] See demonstration, pp. 3-1, 5-1.

	Reference	Demonstration Citation	Criterion Met?
Did the agency submit an Initial Notification of Potential Exceptional Event and flag the affected data in the EPA's Air Quality System (AQS)?	40 CFR §50.14 (c)(2)(i)	Section 1: p. 1-2; August 21, 2019 email[43]	Yes
Did the initial notification and demonstration submittals meet the deadlines for data influenced by exceptional events for use in initial area designations, if applicable? Or the deadlines established by the EPA during the Initial Notification of Potential Exceptional Events process, if applicable?	40 CFR §50.14 Table 2 40 CFR §50.14 (c)(2)(i)(B)	March 3, 2020 Letter[44]; March 31, 2021 Letter[45]	Yes[46]
Was the public comment process followed and documented? • Did the agency document that the comment period was open for a minimum of 30 days? • Did the agency submit to the EPA any public comments received? • Did the state address comments disputing or contradicting factual evidence provided in the demonstration?	40 CFR §50.14 (c)(3)(v)	Section 7: p. 7-1	Yes
Has the agency met requirements regarding submission of a mitigation plan, if applicable?	40 CFR §51.930 (b)	NA	NA

Conclusion

The EPA has reviewed the documentation provided by CARB and SMAQMD to support claims that smoke from the Camp Fire in Butte County, California caused exceedances of the 1987 24-hour PM_{10} NAAQS at the Sacramento T Street, North Highlands, Del Paso Manor, and Sacramento Branch Center monitoring sites on November 10-12 and November 14-16, 2018. The EPA has determined that the flagged exceedances at these monitoring sites on these days satisfy the exceptional event criteria: the event was a natural event, which affected air quality in such a way that there exists a clear causal relationship between the event and the monitored exceedances and was not reasonably controllable or preventable. The EPA has also determined that CARB has satisfied the schedule and procedural requirements for data exclusion.

[43] See email from Sylvia Vanderspek, CARB, to Gwen Yoshimura, EPA Region 9, dated August 21, 2019.
[44] See letter from Elizabeth Adams, EPA Region 9, to Sylvia Vanderspek, CARB, dated March 3, 2020.
[45] See letter from Mark Loutzenhiser, SMAQMD, to Richard Corey, CARB, dated March 31, 2021.
[46] The EPA response letter to the Initial Notification process identified March of 2021 as the submittal deadline, but stated that the deadline was based on the projected timing of the second 10-year PM_{10} Maintenance Plan, and should the Plan timing change, the submittal timing should be revisited as well. The demonstration was submitted by the District to CARB and the EPA on March 31, 2021, as documented in the March 31, 2021 letter from SMAQMD to CARB. CARB officially submitted the demonstration to the EPA on April 26, 2021.